

NEW VARIETIES ON THE HORIZON

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The goal of the wheat breeding program at OSU/CBARC is to provide the Oregon producer with the highest yielding, most disease and stress resistant cultivars possible in a variety of market classes. To do this a variety of testing sites are utilized: Corvallis, Moro, Pendleton-CBARC, Pendleton-Rugg, Ontario, Klamath Falls, Medford, La Grande, and Hermiston. These sites are analogous to laboratories with different areas of specialization. Corvallis is an excellent laboratory for cool, moisture-loving fungal diseases like *Septoria tritici*, *Septoria nodorum*, powdery mildew, and stripe rust; in Ontario cultivars can be tested for genetic yield potential; at Moro drought tolerance, shattering, and emergence can be assessed; at both the Pendleton sites bunt and RWA screening, as well as yield potential, are being tested. The Rugg's site has a higher rainfall pattern and pre-irrigation is available to insure a good stand going into the winter. Each location/lab provides information on a different part of the puzzle in piecing together a new variety. One puzzle piece that is often missing, the laboratory results that aren't always reliable, is that of a winter hardiness location. This year a winter hardiness nursery was seeded near Helix, and a good differential response to cold temperatures has been observed at this site.

Varieties being developed by the wheat breeding program involving winter types include: soft white, club, hard white, and durum, and for spring cultivars: hard white, soft white, and hard red wheats.

They are listed in approximate order of effort in the breeding program.

SOFT WHITE WINTER

Three lines that have emerged from the pack for yield, quality, or both are: OR870012, OR870831, and OR880525. OR870012 is a fairly tall, late line. In five years of testing it has outperformed Stephens at Pendleton and Corvallis (Table 1). The quality is similar to Stephens. It has better resistance to leaf and stripe rust and *Septoria tritici* than Stephens (Table 2). OR870831 is an early, short, disease resistant line with good yield potential. It has outyielded Stephens at both Pendleton and Corvallis and equaled Madsen at both locations. Quality has been variable. Flour yield is less than Stephens, but in some instances cookie diameter and sponge cake volume have been superior. OR880525 is between Madsen and Stephens in height, with maturity similar to Madsen. In four years of testing it has been better in yield than Stephens at Corvallis and equaled its yield at Pendleton (Table 3). Its major attribute is its superior milling properties and test weight.

Table 1. Yield (bu/acre) of Soft White Winter Wheats Compared with Stephens and Madsen 1991-95.

Cultivar	Yrs.			
	Tested	Pendleton	Corvallis	Moro
Stephens	5	108.6	90.1	82.9
Madsen	5	120.2	114.8	77.5
OR870012	5	114.8	124.0	76.6
OR870831	5	117.4	115.7	79.8

CLUB WHEAT

The Club Wheat Breeding portion of the project is discussed in a separate section of this report.

Table 2. Agronomic Data on Selected Soft White Winter Wheat Cultivars 1991-95. Disease and winterhardiness data reported is worst case over all locations.

Cultivar	Heading Julian date	Height inches	Leaf Rust	Stripe Rust	Septoria* Tritici	Winter- hardiness**
Stephens	135	43.0	60S	40MR	90	1.9
Madsen	141	46.5	--	--	60	2.5
OR870012	140	48.0	20MS	10MR	70	3.5
OR870831	129	42.5	--	1R	70	2.8
OR880525	141	45.0	60S	20MR	83	2.1

* Septoria tritici scale: 0-99% of leaf area covered

** Winterhardiness scale: 1-5, with 1 as full stand, no damage, and 5 as dead

Table 3. Yield (bu/acre) of OR880525 Compared with Stephens and Madsen 1992-95.

Cultivar	Yrs.			
	Tested	Pendleton	Corvallis	Moro
OR880525	4	98.3	106.0	83.4
Stephens	4	99.8	82.6	86.6
Madsen	4	115.5	112.9	79.7

Table 4. Yield (bu/acre) of Hard White Winter Wheat Compared with Stephens 1990-95.

Cultivar	Yrs.			
	Tested	Pendleton	Corvallis	Moro
Stephens	6	101.8	95.9	81.5
OR850513	6	100.5	116.8	77.7

HARD WHITE WINTER WHEAT

The Asian noodle market, the target area for the hard whites, is like the proverbial elephant and the blind men. It is vast and varied, and every place you touch it, it seems like a different creature. The overriding quality characteristics needed for Asian noodles are intermediate protein levels, good starch quality, and color stability. If these three characteristics can be put into a good agronomic package, many types of Asian noodles can be made, from trunk to tail.

Two advanced hard white winter lines that look promising are OR850513 and OR889176. OR850513, after many years of yield testing, has equaled Stephens at Pendleton and outperformed both Stephens and Madsen at Corvallis (Tables 4 & 5). It is earlier and shorter than either cultivar (Table 6). It is better on *Septoria*, leaf rust, and stripe rust than Stephens. Though a

Table 5. Yield (bu/acre) of Hard White Winter Wheat Compared with Stephens and Madsen 1991-95.

Cultivar	Yrs.			
	Tested	Pendleton	Corvallis	Moro
Stephens	4	96.0	86.9	82.3
Madsen	4	107.2	113.1	72.5
OR850513	4	96.8	115.6	80.4
OR889176	4	107.4	107.2	75.1

Table 6. Agronomic Data Comparing Stephens and OR850513 from Three Years of Western Regional Data 1992-94.

Cultivar	Station ¹ Years		Height (in.)
	Heading		
Stephens	18	153	33.8
OR850513	18	150	32.8

¹ 6 locations X 3 years = 18 station years.

hard white wheat, it often has an intermediate hardness score that could be a classification problem. It is not a good bread wheat, but it has good color stability, intermediate protein levels, and in three years of regional testing it had the highest

RVA score of the hard whites every year. RVA score is a measure of starch quality. Though the RVA is high, there is a question as to whether it is high enough to satisfy the noodle market. OR889176, in four years of testing, has outperformed Stephens at both Pendleton and Corvallis, and has equaled the yield of Madsen at Pendleton (Table 5). This line is shorter and earlier than Stephens and Madsen and is awnleted. Its major drawback could be winterhardiness, as it is the progeny of a spring x winter single cross (Table 7). It has been evaluated for quality for eight years. It is a good milling line, but its RVA score has not been the most promising. It also has some problems with color stability. On the plus side it has made excellent pancakes, and in that niche shows promise in the domestic market.

Table 7. Agronomic Data Comparing Stephens and OR889176 from 1994 Western Regional Nurseries.

Cultivar	Heading	Height (in.)	Winter Hardiness
Stephens	156.4	32.5	6.5
OR889176	154.0	31.2	6.0

WINTER DURUM

There are three winter durums on seed increase this year: OR3920036-A, OR3920036-B, and OR936723. These lines have been bred for the Pendleton area. The yields of these three lines are 100, 91, and 87 percent of Stephens over a two-year period. All of these lines have acceptable quality characteristics for the local market -- good gluten strength and good yellow color. Winterhardiness could be a problem. Most of the durum lines have been crossed with spring types to get the quality characteristics necessary for the market. This confounds an already tender crop. Another problem

encountered is yellow berry. This 'softens' the kernel, making it unacceptable. There is an ongoing agronomic study to determine what fertility level is necessary to alleviate this grain quality problem.

SPRING WHEAT

The spring wheat aspect of the program works on hard red, hard white, soft white and durums. The majority of the germplasm comes from our international connection with the International Wheat and Maize Improvement Center (CIMMYT). Early generation material is available to us for selection under growing conditions in Oregon. We also obtain the CIMMYT international nurseries, which include primarily F5 lines. From this vast pool of genetic material, one hard white wheat line has been selected for pre-release. OR4895181 has a very good yield record. Over six years it has outyielded Klasic by five bushels/acre at Pendleton. At Klamath Falls in four years of testing it has outperformed Klasic by 11 bushels. (Table 8) It is in its third year of regional testing. In 1994, the only year from which summarized regional nursery data are available, it was the top yielding hard white spring line in the nursery (11 locations) and was among the top five lines overall.

Table 8. Spring Hard White Cultivars Yield in Bushels/Acre.

Location	# of Years	Klasic	4895181
Pendleton	6 (90-95)	80.3	85.8
Klamath Falls	4 (92-95)	72.4	83.2

Agronomically, OR895181 has a heading date equal to the soft white spring wheat Penawawa and it is five days later than Klasic. In height it is equal to Penawawa and is, on the average, 7 inches

taller than Klastic. Its maturity is also similar to Penawawa. Table 9 presents data comparing OR895181 with the new Idaho hard white spring line, ID377s, and the new soft white spring from Washington, Alpowa.

OR895181 has been evaluated for quality for six years. During this time it has had good RVA scores (over 190 in four out of four years tested), but it has had some problems with low test weights and low milling scores. Its bread making capabilities appear to be adequate.

Table 9. Agronomic Data on Klastic, ID377s and OR4895181 taken from the Western Regional Spring Wheat Nurseries (WRSWN) in 1994.

Variety	Heading (Days from Jan. 1)	Height (inches)
Klastic	169.5	22.8
ID377s	172.4	30.0
OR4895181	174.1	29.8
Penewawa	174.6	30.0
Alpowa	174.8	32.7